

Abstract

The invention is directed to a method and apparatus for processing an output
 signal of an image sensor pixel in a manner that will substantially avoid fixed pattern
 noise contributed by the readout circuitry. The method comprises applying a reference
 voltage V_{REF} to first and second capacitor elements that are coupled together at a
 common terminal, applying a first sample signal V_{S1} from the image sensor pixel to the
 first capacitor element placing a charge on it, transferring the charge from the first
 capacitor element to the second capacitor element, applying a second sample signal V_{S2}
 from the image sensor pixel to the first capacitor element placing a charge on it, and
 transferring the charge from the second capacitor element to the first capacitor element so
 as to provide an output signal that is a function of the difference between the second
 sample signal V_{S2} and the first sample signal V_{S1} . In particular $V_O = V_{S2} - V_{S1} + V_{REF}$.
 The readout circuitry comprises a first capacitor element having first and second
 terminals, a second capacitor element having first and second terminals, an amplifier
 having an input terminal and an output terminal with the input terminal connected to the
 second terminals of the first and second capacitor elements. The readout circuitry further
 includes a first switch adapted to be connected between a reference voltage and the first
 terminal of the first capacitor element, a second switch adapted to be connected between
 a pixel and the first terminal of the first capacitor element, a third switch adapted to be
 connected between a reference voltage and the first terminal of the second capacitor
 element, a fourth switch connected between the amplifier input terminal and the output
 terminal, a fifth switch connected between the second terminal of the second capacitor
 element and the amplifier output terminal, and a sixth switch connected between the first
 terminal of the first capacitor element and the amplifier output terminal. The readout
 circuitry also includes a controller for controlling the first to sixth switches. The
 amplifier may be a CMOS operational amplifier with a reference terminal for connection
 to a reference voltage and all of the switches may be CMOS transistors.